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ABSTRACT

Developed in order to understand how learning theory can be applied to software application in the classroom, the learning model discussed in this paper is based on the assumption that the learner wants to learn, accepts a challenge, has a willingness to try software, and will become independent in choosing software and making it work. A hierarchy of software complexity developed through observation of students is identified that delineates four levels ranging from simple feedback programs at the lowest level through increasing learner control to utility programs. The following parts of the model are then discussed in the context of an adult computer classroom: (1) insight into students' knowledge and needs; (2) choosing appropriate software; (3) hands-on work; (4) establishing an appropriate level of challenge; and (5) sharing of experiences and results. Two footnotes and a five-item bibliography are included. (MES)

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MODEL TO DEVELOP COMPUTER SOFTWARE USAGE IN COMPUTER LITERACY

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Computer software is in great demand. As the educational computing industry has been growing, a frantic scramble for materials has been taking place. Consequently, the quality of software is very uneven. Until recently, most materials were little more than drill-and-practice. However, simulations and other programs for higher levels are now arriving in the marketplace. With the advent of all this software, there is a growing need for teachers to evaluate software more carefully. They must be careful that they choose the appropriate software to fit the needs of the students that they are dealing with.

SCENARIO

The instructor is working with a group of 10 students in a computer lab. The instructor says, "I want everyone to watch as I load this program on the computer. First, I turn on the computer, load DOS which means Disk Operating System, and then type in PM when the A> appears." On the screen appears a menu. "I will push the arrow keys to highlight which part of the menu I will choose. I will choose the 'Make A Sign' option. Then I will push the 'Return' key to enter my choice." A new screen appears with two new options. "I will choose the 'Design Your Own' this time." He once again uses the arrow keys to make a choice and then pushes the 'Return' key to enter his choice. A new screen appears with choices of pictures or designs that one may choose. One student says, "Let's make a birthday sign. Can I do that?" The instructor says, "Sure, take a seat so you can get started." Paul begins to push the arrow keys to make his selection and then hits the return key to enter the selection. Another screen appears asking for the type of 'font' he would like to print on his sign. Betty asks, "What's a font?" Paul says, "See, it's the type of writing I would like." As Paul pushes the arrow keys to view the types of print, Betty says, "Oh, why don't you choose that one?" Paul agrees and pushes the return key to enter his choice.

The instructor asks, "Are there any questions about how Print Master works? If not, I would like you to find a partner and work in pairs on the computer keyboards on the Print Master program." The instructor goes to the blackboard and writes down the procedure to load the program on the computer. The instructor now serves as a resource person giving help and encouragement to the groups as needed.

Tom and Jeff are working together and are having difficulty in returning to the previous screen to make a change. The instructor says, "Try the ESC key." They do and it works.

After 20 minutes, the instructor observes that some students are engrossed in the program, but he also notes that a few are beginning to look around and appear bored. The instructor says, "Can I now have you four people over there join me at this computer?" Once again the instructor begins to introduce to a smaller group a piece of software that may be a bit more challenging to them.

In this scenario, the instructor is trying to feel out the computer literacy levels of his students through the use of software. The instructor demonstrates

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how the program operates. He then allows for individual experimentation on the computers, at the same time offers any assistance whenever possible. Also through observation he notes who needs more challenging software and begins to make changes.

PURPOSE

The purpose of this model is to develop a learning model and apply it to computer software application in the classroom. My major question was how can learning theory be applied to computer software application in the classroom. Nowhere did I find any information concerning learning theory and software. My major references for developing this model is derived from "A Model To Develop Computer Literacy In Education," by Ralph Stuckman, Computers In Education, 1985 (1). The learning theory for this model is derived from Models of Teaching of 1980 (2).

INTENT

I found that computer magazines have software reviews but each has its own formula for rating software. It would seem apparent that it would be easier for the classroom teacher in choosing software if there were one means for classifying software. Through observations of students, I found that software can be divided into a definite hierarchy. I proceeded to define these various levels of software and then interrelate the software application with learning theory in the classroom.

SOFTWARE HIERARCHY

At the lowest level is a simple 'feedback' program. A user boots up a software disk that allows him/her to input answers, and then the computer reacts to that input via the monitor, sound system, or some other method. Several programs are available on this level and are applicable to all grade levels. Such programs are used for drill and practice in various subject areas. However, they all have one thing in common. The user assumes a relatively passive role and merely responds to the screen.

A higher level of software allows the user to assume a more active role. Maybe the user can color objects, create pictures, input figures, and watch results being graphed or perhaps he/she can select the vocabulary words to be studied or adjust the rate of speed or reading. However, the computer is still basically in control, and the user has only limited control over what it does.

A third level of software allows the user greater control. Programming is the best example of this level, especially logo. Logo is ideal for all levels of computer students because it grows with the student. It allows the student to tell the computer what he/she wants it to do. Its limitations exist only because the software can't do everything. Most of this level of software is useful at all academic levels because it is basically user-controlled.

The fourth and highest level of software is utility software. Some software from Level Three can be carried over to this level, but mainly it is made up of software that is usable for some other purpose. Grade level is not important because the software is useful on most levels. Included in this level are word processors, spreadsheets, data bases, music construction, and graphic pads. All these types of programs are available in a wide variety of difficulties and powers. The same is true of data base programs.

An extension of level four software for teachers includes gradebook programs, test generators, attendance keepers, schedule generators, sports filing systems, and several other useful programs. They all revolve around the principle that software is useful above and beyond itself.

VALIDATION OF RESEARCH

After my initial work of revieving and classifying software, I undertook validation efforts. I observed 10 to 30 people who ranged in age from 10 to 60. This model became validated with adults during 18 four-hour instruction settings for two consecutive years.

ASSUMPTIONS

Before the model can progress, a few basic assumptions about the learner must be made. First, the learner must want to learn. Second, the learner must accept a challenge to progress in software usage. Third, the learner must have a willingness to try software to see what happens. And fourth, the learner must become independent in choosing software and make it work. Taking all these factors into account, we will proceed to develop a model which consists of five parts: Insight, Choosing Appropriate Software, Hands-on Work, Challenge, and Knowledge of Results.

THE MODEL

The model consists of five parts: Insight, Choosing Appropriate Software, Hands-on Work, Challenge, and Knowledge of Results. We will build each concept and show how it works from an actual classroom scenario.

Insight

The instructor is working with a group of adults in a computer classroom. The group consists of 12 people each with varying degrees of computer literacy. As the class begins, the instructor says, "Let's find out a little about each other by telling why we are interested in taking a computer course." Alan is first, "I have a Franklin computer at home, but only my sons are capable of operating it. I just don't understand computers at all. I would like to learn something about them in this class." Mary is next, "I am a clerical teacher. Our school has purchased a new word processing program that I must teach to my students. I just don't have enough time to review and learn the program at school. I would like to be able to do some of that type of computer work in this class." Jeff says, "I am a band instructor and have a computer at home along with a synthesizer. I would be interested in seeing what types of programs are available for my band program at school." The instructor proceeds to have each individual express their accomplishments, desires, or goals that they would like to gain from the computer course.

The instructor is working with the various computer literacy levels of the students. The instructor can gain some knowledge of how much computer expertise each student possesses through the relaxed dialogue. This initial dialogue is the first phase of the model - Insight.

The instructor has found out through Insight that Alan has a limited computer background and that other students like Mary are advanced in their computer knowledge. Through this Insight he is now able to progress to the second phase - Choosing Appropriate Software.

Choosing Appropriate Softvare

The instructor continues, "Let's gather around the front table. I have placed on the table a variety of software. I would like you to look over the different programs and I will help you make a decision as to what you will be working on today."

Instructor, "Mary, you mentioned that you would like to work on a word processor. Which one would you like to work on? I have Word Star, PC Write, and Deskmate."

Mary, "The one I have at school is Wordstar."

Instructor, "Then try this Wordstar tutorial. First you need DOS, then at the A> type 'Fearnot.'"

Instructor, "Alan, what can I get you started in today?"

Alan, "I don't know. I guess I'll try anthing."

Instructor, "I would like you to try this IBM Tutorial. It will help you learn the keyboard and the computer. It's easy to use and it loads easily. If you have any problems, let me know."

Alan, "That sounds fine."

Instructor, "Jeff and Carol, how about you two working together on Electric Poet? You'll need this documentation."

Instructor, "Sally, since you have already been exposed to most of this computer software, would you like to work on an authoring system?"

Sally, "I would but I think I'll need some help."

Instructor, "Jim, do you mind working with Sally today on this program? You've worked on it before so maybe you can give her assistance."

Jim, "Sure, I'd be glad to."
In this part the learners are advised and guided in choosing the correct piece of software. What is important to know is that not all software is suitable for each individual. The instructor must know his software and be able to apply it to the computer literacy levels of his students. The instructor has now completed the first two phases of this model. The model now looks like the following:

Hands on Work and Challenge

The students beging working on the appropriate software. As time passes, Group 1 experiences difficulty loading a drill and practice game.

Jim, "Why won't this program load? We keep pushing the number 1 and 2 keys like it says, and nothing happens.

Instructor, "Show me which number 1 and 2 you are pushing."

Jim, "Here, watch this."

The instructor proceeds to watch as Jim pushes the number 1 and 2 keys. Nothing happens.

Instructor, "Try using the numerical pad keys."

Jim tries, and the program begins to operate.

Bob and Kathy are working on a Logo program. Bob, "Hey, what's happening? I can't get this to do anything. It keeps repeating the same thing."

Instructor, "You are locked into a loop. Try hitting the Control and Break keys at the same time."

Bob does this and the program stops.

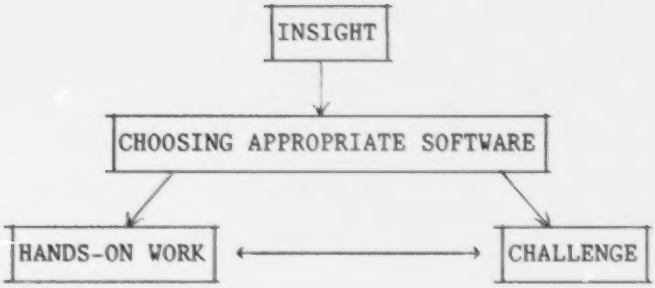
As the instructor continues to walk around the room he observes that some individuals have been challenged.

Sally, "I don't understand this program at all. I am following the directions, and it is working, but it just doesn't make any sense to me. I don't understand what I am doing."

Instructor, "Put it away and try something else. Let's put you on Logo."

Sally, "That sounds good to me."

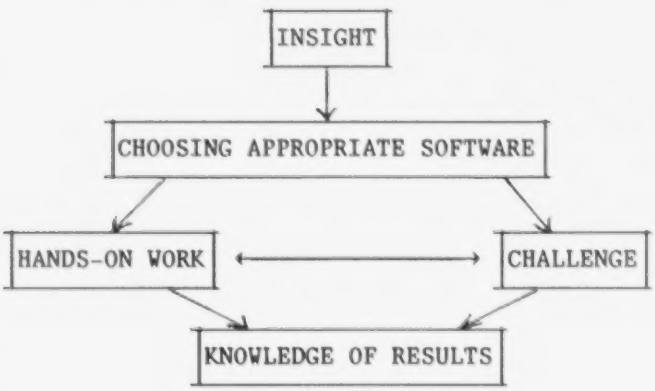
The instructor in choosing appropriate software avoids the frustration level of the learner. He wants them to be challenged, but, if he observes frustrations arising, then he suggests them to back up or try a piece of software that is less difficult or intimidating to the learner. The instructor observes that Sally was experiencing difficulty and was reaching her frustration level. He suggested she try a program that was less difficult. Learning theory has shown that growth and development of tasks occur simultaneously but at different rates. When a learner becomes frustrated and cannot function, he/she has not mastered the skills necessary to complete the task, hence the learner must return to a level that is familiar and comfortable to them. Along with the developmental theory is the understanding that the background and learning conditions of the learner must be taken into account. The learner builds upon past experiences. The computer can easily give this option to the learner. The learner can back up and work on software that is familiar and nonthreatening. The model has added the Hands-on Work and Challenge feature so that the model diagram looks like the following:



Knowledge of Results

After an hour of practice, the instructor calls the whole group together. He shares with the group what he observed during the Hands-on Work. Individuals were also able to share their experiences with different levels of software. Other points brought out during this discussion session were how some individuals were able to handle frustrating or challenging situations and some were not. Some had to stop and choose software at a lower level which was less intimidating while others were able to overcome some of their difficulties by using peers to assist or instruct them.

The model has progressed to the final model part, the Knowledge of Results. The model parts have been developed from Insight to Knowledge of Results and are like the following:



The ultimate goal is to have students experience the creation of new knowledge through software application. The way students interact with the software is a very important feature in determining which software should be made available. It is also important to know that different types of software can be best used to benefit the learner only if it is on the learner's independent or instructional level. The levels of software can also be an invaluable tool. It can evaluate the learner by showing what level of computer literacy an individual has attained.

PHASE STATEMENTS

The following statements provide a summary of the major aspects of this model.

I. Insight into the learner is a basic role of the professor.
   1. Gaining insight into students' knowledge of the computer is important.
   2. Assessing students' needs provides a plan for optional instruction.

II. Choosing appropriate software is a step towards learner independence.
   1. Analyzing software, according to difficulty:
      a. Feedback program is the easiest software to use.
      b. User limited control is a little more difficult than feedback.
      c. Utility software is the next level of difficulty in this hierarchy.
      d. Teacher utility software is for the independent and mature student in computer literacy.

III. Hands-on Work is the heart of this model.
   1. Students need to be grouped according to needs and interests.
   2. The professor identifies students' computer literacy levels.
   3. Observations take place continually.
   4. Assistance is available and almost immediately by the professor.

IV. Challenge is a significant role for the learner.
   1. Instructional level needs to be appropriate for the learner.
   2. Frustration level is to be of a minimum level.

V. Knowledge of Results
   1. Instructor reacts to what happens in class.
   2. Students share experiences.
   3. Instructor shares with students his notations of accomplishments and possible problem situations.
   4. Log is written by the student which includes a paragraph of summary and a paragraph of reaction for each session.

FOOTNOTES

(1) Stuckman, Ralph, "A Model to Develop Computer Literacy in Education," Computers in Education, 1985, pp. 681-685.

(2) Joyce, Bruce, and Weil Marsha, "Models of Teaching," Prentice-Hall, Englewood Cliffs, NJ., 1980.

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